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that permitted the sea to wash the terminal moraine, and cover all points less than eight hundred or a thousand feet above tide. Out of the modified and unmodified drift the modern rivers have carved their channels, leaving a series of well-marked terraces, the highest of which are now two hundred feet above the streams.

But in the northern or Wilkes-Barre coal basin, the Susquehanna and its tributaries are still fifty to a hundred and eighty-five feet above their pre-glacial beds for a distance of at least twenty-five miles; and these buried valleys are of unusual interest, because at Bloomsburg, Sunbury, and Selinsgrove, points on the Susquehanna thirty to seventy miles below Wilkes-Barre, the rocky bed of the river is a hundred and ten, ninety, and seventy feet respectively higher than the buried channel at Wilkes-Barre.

The geological structure of this district is typically Appalachian, a north-west and south-east section including ten principal overlapping flexures of the strata, and the synclinals holding the anthracite-coal fields.

Professor White believes there is a transition series between the Pocono sandstone No. x. and the Catskill No. ix., and another between the Catskill and the Chemung No. viii.

The paleontology of this report presents several striking anomalies; various Devonian and Silurian types, including some of those regarded as most characteristic of their respective horizons, occurring here in associations, and following each other vertically, in an order unknown elsewhere. Professor Lesley suggests that this apparent confusion may be due, in part, to incorrect determinations of the forms. But some of the confusion is real; for *Halysytes catenulata*, a coral which no one could mistake, occurs very abundantly at one locality in the Stormville limestone, which belongs near the middle of the lower Helderberg, although this form was never before found above the Niagara.

Like most of the Pennsylvania reports, this volume is abundantly indexed; there being six different indexes, covering fifty-four pages.

#### NOTES AND NEWS.

A SHORT time since, we referred to the call of the Peabody museum of American archaeology for funds to enable the museum to continue its important and thorough explorations in Ohio. So far the work has been continued without interruption, thanks to the persons whose subscriptions are here acknowledged: Mr. John C. Phillips, Boston, \$200; Hon. Stephen

Salisbury, Worcester, \$100; Hon. Robert C. Winthrop, Boston, \$50; Mr. H. A. Homes, Albany, N.Y., \$5; Mr. A. H. Thompson, Topeka, Kan., \$5; Mr. A. E. Douglass, New York, N.Y., \$47; Mr. William B. Weedon, Providence, R.I., \$50; Mrs. Esther Herriman, New York, N.Y., \$50; total, \$507.

— The French association for the advancement of science has appointed two delegates to attend the Philadelphia meeting of the American association,— Professor Joubert, professor of physics, and general secretary of the French society of physics; Professor Silva, professor of chemistry at the Municipal school of physics and industrial chemistry. This is of interest as promoting the formation of an international association.

— Before the section of economic science and statistics of the American association, papers are announced on the following subjects: A study of cotton fibres, their value, etc., illustrated by photo-micrographs; The economics in deaf-mute instruction; Explanation of instruments used to determine the power to move trains, and also of instruments for the inspection of railroad-tracks; The apprenticeship question and industrial schools; The value of photo-micrographs of wood-fibres, illustrated with sections of thirty different woods; The use of graphics in statistics; Exhibitions, national and international, considered as economic forces; Theory and economy of the American system of patents; The allotment of lands to Indians, illustrated by experience with the Omaha tribes; The public and the professions, 1870-80; Statistics and organization of the classified public service in the United States; Some general results of the census of crime and misfortune in the United States; The economic element in the problem of manual training. (Several papers are expected on important topics.)

— We are informed by a private letter that three of the younger mathematicians of Germany, all men of mark, are expecting to attend the meeting of the British association in Montreal, and are planning afterwards to visit the United States. Reference is made to Messrs. Lindemann of Königsberg, Dyck of Munich, and Wedekind of Carlsruhe, all of them professors ordinarii in their respective places.

— *Nature* states, that, at the request of the council of the British association, Admiral Sir Erasmus Ommanney, C.B., F.R.S., has consented to act as treasurer during the meeting at Montreal, Canada. It further announces that Prof. W. G. Adams of King's college will be unable to give the Friday evening lecture at Montreal, and that Prof. O. J. Lodge will take his place. The subject of Professor Lodge's lecture will be 'Dust.'

— The Seth Thomas clock-company has undertaken, under the advice and guidance of Dr. L. Waldo, the construction of clocks of a high grade of excellence for scientific purposes, which they propose to call clocks of precision. They have already made considerable progress as to the best form of pendulum suspension, and dimensions of the steel-jar mercurial pendulum (which is filled *in vacuo* by a new

process): and, as soon as the small physical laboratory they are now building for this purpose is completed, they propose to investigate some of the questions which make good clock-making such a difficult art; such as, the permanency of length of pendulum-rods of various materials, the effect of air mechanically contained in the ordinary mercurial pendulums, the effect of mercuric oxide and other impurities of the mercury, and the effect of temperature changes on various forms of pendulum suspension.

This is another instance of the tendency shown by American artisans to avail themselves of the most recent knowledge to be derived from scientific research. Some time since, we noticed that the Pratt & Whitney company of Hartford were spending many thousands of dollars in their efforts to produce screws and other measuring-engines which would accurately correspond to the established yard and metre. In this work they availed themselves of the assistance of Professor Rogers of Cambridge; and the results they attained must be gratifying to every student of physical science interested in having accurate screws and gauges for use independently, or in connection with other pieces of apparatus.

—The efforts of the committee of the Franklin Institute to secure a valuable collection of books on electricity for the electrical exhibition are meeting with considerable success. Already the collection numbers about three thousand titles, and is constantly increasing. As is well known, the Pennsylvania railroad company has placed its old passenger-station at the disposal of the managers of the exhibition to furnish additional space.

—The Chesapeake zoölogical laboratory, which is the name under which the marine zoölogical station of the Johns Hopkins university has been maintained during the last six years, is stationed this year at Beaufort, N.C., —a site which has been proved during three previous seasons, from 1880 to 1882, to be most favorable for zoölogical researches. Dr. W. K. Brooks, the director of the laboratory, has been prevented by long-continued ill health from assuming his usual responsibilities, though he has hoped to join the party for a time. His place as chief of the party has been taken for the season, at the request of the university, by H. W. Conn, Ph.D., who received not long ago one of the Walker prizes from the Boston society of natural history, and who has recently been appointed to a position in the Wesleyan university at Middletown. Besides Dr. Conn, there are nine investigators at work; among them, W. Bateson of St. John's college (Cambridge, Eng.), H. H. Donaldson (A.B., Yale), E. A. Andrews (A.B., Yale), I. Nelson (S.B., Univ. Wisc.), H. L. Osborn (A.B., Wesl.), and H. F. Nachtrieb (S.B., Univ. Minn.). Others were expected to join the company. Private letters from Beaufort give indications that the summer's work will be fruitful in good results.

—The Greely relief squadron, with the survivors on board, arrived at Portsmouth on Friday, Aug. 1, and a reception with a grand parade was given to them Monday, Aug. 4. The remains of those who perished have been sent to New York for burial.

—North-western North America contains so many different linguistic stocks, and these are split up into such a large number of languages and dialects, that any contribution to the supply of vocabularies from this region is important. A pamphlet of a hundred and twenty-seven pages, just issued by the geological survey of Canada, contains vocabularies of "one or more dialects of every Indian language spoken on the Pacific slope from the Columbia River north to the Chilkat River, and beyond, in Alaska, and from the outermost seaboard to the main continental divide in the Rocky Mountains," and is therefore a most welcome addition to the working-material of the linguistic scholar. The vocabularies result from the joint labors of Messrs. N. Fraser Tolmie and George M. Dawson, whose names are a sufficient guaranty for the general accuracy of the work. The vocabularies number more than thirty, and are classed by the authors under no fewer than fourteen distinct stocks, —a number which it is probable will require to be reduced. Few scholars, at least, will be willing to admit Tsheheilis as a stock distinct from Selish, of which latter it is usually considered to be the westernmost division, nor to consider Bilhoola, Kawitshin, and Niskwalli distinct from Selish. The value of the volume is greatly enhanced by a map colored to show the distribution of the Indian tribes of British Columbia. The linguistic stocks, the distribution of which within the above area is shown, are the Tlinkit, Tshimsian, Haida, Tinné, Kwakiol, Bilhoola, Aht, Kawitshin, Niskwalli or Skwalliamish, Selish, and Kootennha. The work is a substantial addition to the linguistic history of the area to which it pertains.

—The bibliography of Ptolemy's geography, which Mr. Justin Winsor has been printing by instalments in the Harvard university *Bulletin*, has been issued separately, in advance of its completion in the *Bulletin*, and forms an interesting contribution (forty-two pages) to historical geography. It is particularly valuable for the information it gives regarding the early cartography of America, and the ante-Columbian views of the ocean west of Europe. Much collateral matter serves to elucidate the subject. The name 'America' appears for the first time on a Ptolemaic map in 1522; but reasons are given for believing that it occurred in print or in manuscript as early as 1513–15. It appears that copies of the 1478 edition have been sold at eighty, ninety, and a hundred pounds.

—According to *Nature*, Pasteur's experiments with the virus of hydrophobia are going on with unbroken success. He has thus far experimented on fifty-seven dogs, —nineteen of them mad, and thirty-eight bitten by them under uniform conditions. Out of these thirty-eight, half had been previously inoculated, the other half not. The latter, without a single exception, died with unmistakable signs of hydrophobia, whereas the nineteen others are about, and as well as ever. They will be watched for a year by veterinary doctors to see whether the inoculation holds good permanently or only temporarily.

—A meeting was held on July 1, in the lecture-

room of the British museum, for the purpose of conferring as to the advisability of adopting the method of trinomial nomenclature now coming into use among American zoölogists. The meeting was held on the occasion of the visit to England of Dr. Elliott Coues, a prominent advocate of the system in the United States. Dr. R. Bowdler Sharpe read a paper on a series of sub-species of goshawk, differing slightly in character, and coming from South Africa, Senegambia, Turkey, Asia Minor, India, Ceylon, and Burmah. Other cases he cited were those of Corone, in which the species differ only in size. These cases inclined Mr. Sharpe to view Dr. Coues's proposals with favor. He was followed by Mr. Seebold, who stated his belief that the present system of binomial nomenclature had retarded our recognition of the fact of the existence of sub-species. Selecting the forms of nut-hatches, he illustrated the method by which he would convert Dr. Coues's empirical into a more logical system. Dr. Coues was very heartily received. He said he recognized that nomenclature was a necessary evil. Since the establishment of the binomial system by Linné, there had been an absolute revolution in our ideas of what species were. "We now recognize that there are no such things as species, and that forms are so intimately related, that, did we know all, there would be an unbroken series;" and Dr. Coues instanced the American woodpecker in proof of this. Other speakers followed; the main objections to the new system being the fear of endless introduction of new names, and the temptation to those who already refined too much. In summing up, Professor Flower said that some fresh system of nomenclature would be inevitable, but what system remained to be seen.

The distinguished mathematician, Dr. George Salmon, regius professor of divinity in Trinity college, Dublin, has been elected a corresponding member of the Académie des sciences, Institut de France, to succeed Dr. William Spottiswoode, the late president of the Royal society.

*Nature* announces the death of the venerable Abbé Moigno at the age of eighty-one years. The name of the abbé has been long known in connection with French science, and more especially as the founder, and till quite recently the editor, of *Les mondes*.

The State natural-history society of Illinois held its annual meeting at Peoria, at the National hotel, commencing July 7. Among the papers presented were the following: The president's address, Dr. Julius S. Taylor; Illinois forestry, T. J. Burrill; Developments in the Streator coal-field, Edwin Evans; Mastodon and other remains of the loess and drift clays, and their relation to the climatology and geology of the deposits, Dakota mounds, Ancient pictographic records on the rocks in the vicinity of the Missouri River, Experiments with a copper-head serpent, William McAdams; Marine algae, Rise of sap in trees, Corn fungi, A. B. Seymour; Silk-culture, J. E. Armstrong; Phytopus galls on the leaves of Nyssa multiflora, H. Garman; Artificial production and

propagation of insect diseases, S. A. Forbes; Location of sound by the ear, J. B. Taylor; Life-history of Prionyxystus robiniae Peck, Parasites of Apatura clyton, Preliminary stages of Papilio cresphontes, A. H. Mundt; Higher cryptogams, Mrs. Dr. Griffith; Instruction in zoölogy, B. P. Colton; Zoölogy in country schools, F. A. Houghton; Introduction of fishes into new waters by natural means, D. B. Wier; Embryology of the buccal mucous membrane, Will X. Sudduth.

— At the March meeting of the Royal astronomical society, Dr. David Gill, her majesty's astronomer at the Cape, stated that he had prepared a scheme for the investigation of the parallax of stars, but that the carrying it out, in so far as the southern hemisphere was concerned, depended on the generosity of the lords commissioners of the admiralty in providing him with a heliometer necessary for the purpose. On the 13th of June he had an interview with the authorities of her majesty's treasury, and was permitted to state to the society, at its meeting on the evening of the same day, that they would not be wanting in the necessary generosity. It will be remembered that the co-operation of Dr. Elkin, working with the large heliometer of the Yale college observatory, is included in this plan.

— The first De Morgan memorial medal has been awarded by the London mathematical society to Professor Arthur Cayley, for his contributions to the modern higher algebra and other branches of mathematics. The presentation of the medal will take place at the annual meeting of the society, in November next.

— The way of connecting electric-light circuits, which is represented in fig. 1, has been introduced by

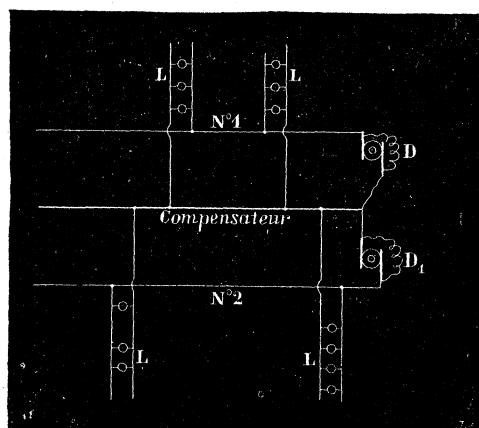


FIG. 1.

Dr. Hopkinson and Mr. Edison. Two dynamos,  $D$ ,  $D_1$ , are connected in series to the principal lines, No. 1 and No. 2; and a third conductor, called the 'compensator,' is introduced to serve as the return circuit. The lamps  $L$  and  $L_1$  are placed between the main lines and the compensating line. It is claimed that this arrangement diminishes the weight of copper

necessary in the wires by sixty per cent; but this figure is probably too high. If the electromotive force of the dynamo is too high for the lamps, a third wire between the two principal conductors may be used, and the lamps inserted between this and the two principal conductors.

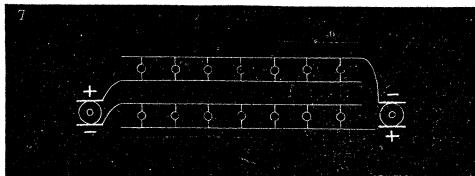


FIG. 2.

Fig. 2 represents an arrangement invented by Mr. J. S. Beesman: it is composed of two dynamos, connected as shown, the two circuits of the dynamos being joined crosswise by the lamps. It will be seen that this arrangement permits each lamp to have the same difference of potential between its extremities, because, as each lamp is nearer one of the dynamos, it is the more distant from the other. If the lines are considered as rails, or other conductors on an electric railway, the speed will be the same at all points of the line; for the difference of potentials between the conductors will be constant: consequently, if several trains of the same weight run over the same line, they will not strain to go by each other.

— Among recent German patents is one issued to D. French St. George of London, for a novel form of phonograph. The cut shows a round photographic plate *a*, upon which a ray of light falls through the opening at *e*. A slide over this opening is connected with the vibrating plate in the mouth-

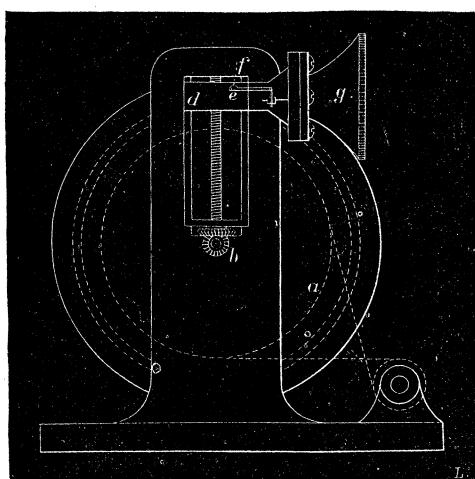
rotation at a constant rate, there is produced, after development, a dark circle of varying width. In order to reproduce the tones of the voice, a ray of light is sent through this photographic image upon a selenium transmitter of the form invented by A. Graham Bell, and used in his radiophone.

— The Berlin African association despatched an expedition to the Kongo during July, of which Lieut. Schulz is to be the leader. News has been received of the two travellers for this association,—Dr. Richard Böhm, and the engineer, P. Reichard,—of the date of last August. They had crossed Lake Tanganyika with the Belgian agent at Karema, Lieut. Storms, to Qua Mpara, and started across unexplored country for Lake Moeso. The *Illustrierte Zeitung* states that Dr. Böhm is to succeed Lieut. Storms in command at Karema. The International African association has founded thirty-two stations in addition to Leopoldville. Ten of these are on the Niadi-Kwilee, twenty on the Congo, and two on the coast. During his last journey, Stanley acquired a considerable length of the river-bank. By means of the steamers and the new roads round the rapids, the journey to Stanley Pool can now be made in fourteen days. Col. Winton has taken the command between Vivi and Stanley Pool.

— M. J. B. Morot, lately deceased, left to the Société de géographie a sum of two thousand francs, the interest of which is to form an annual prize for the French navigator who shall approach nearest to the north pole during the year; or, in default of a suitable receiver, the prize may, at the discretion of the society, accumulate for two years. In the absence of an arctic navigator, it may be awarded to the discoverer of an unknown island or country.

— Capt. Sörensen has determined that the northern point of Europe is not Cape North, as usually assumed, but a promontory called Knivskjeroerde, about ten minutes of longitude west from Cape North, and reaching nearly a thousand metres in a northerly direction beyond the extremity of Cape North.

— Three important memoirs on the geology and geography of eastern Europe have lately appeared. The first, by Dokuchaeff, treats of the distribution of the black loam (*chernoi zemlia*) of Russia, famed for its fertility. Another, by Paul Veniukoff, considers the distribution of the Devonian rocks of Russia. The third, by Vitikin, discusses the formation of the valleys of central Russia. These, according to the author, are due to a gradual elevation of the land, which left the edges of a shallow sea transformed into plains, across which brooks made their way, cutting out ravines and channels, growing in importance and volume as the area of land enlarged, and finally becoming rivers. There was no lake-period, as in the Baltic region. With few exceptions, the lakes of central Russia are ancient river-beds, cut off by changes in the course of the stream. Behr's law is exemplified in the valleys of the principal streams, which, like the Volga, Viatka, and others, have a general parallelism with the meridian.



piece *g* in such a way, that, with the vibrations of the plate, the size of the opening is varied. The result is, that on the photographic disk, which is kept in